## Space Weather Forecast

Issued on Tuesday 26 November 2024 at 01:29 Local

**This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Moderate to High Solar Activity expected with a slight chance of Strong flares. Increasing chance of higher Geomagnetic activity in the coming days.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** High with numerous Moderate-class flares observed in the past 24-hours and a peak near Strong-class flare event at 25/0742 UTC from an as yet unnumbered region close to the northeast limb.

There are currently ten sunspot regions on the visible disc. The largest group, located in the southeast, was the most active flare producing region, with a complex magnetic configuration. This region increased in size, with the emergence of new spots, especially within its intermediate portion. Another large region, located nearby to the north, is also a large, magnetically complex sunspot group, but some simplification was observed in its magnetic structure during the period. Its intermediate spots also tended to decay and separate during the period. Minor growth was seen in a small region in the southwest near centre-disc. Another small region in the southwest decayed to a mature, simple group, but still produced a low-level Moderate flare at 25/2054 UTC. The remaining groups on the disc are smaller and more magnetically simple. A large region, last on the visible disc in early November started to rotate into view over the northeast limb, but is as yet unnumbered.

There are considered to be up to three Coronal Mass Ejections (CME) during the past 24-hour period of note with potential Earth-directed effects, pending further analysis and modelling. The first two CMEs left the Sun in quick succession early on 25 Nov from the southeast disc. Initial modelling suggests that the bulk, if not all of the ejecta is directed south and east of the Earth-Sun line. Perhaps more significantly, a filament (arc of the Sun's plasma) lift-off starting around 25/2030 UTC close to a region in the southwest led to initial signatures of a CME. At the time of writing we are awaiting further solar imagery to backfill in order to confirm if an Earth-directed CME has resulted from this. However, it appears likely that this is the case given the source location of the event on the disc.

**Solar Wind / Geomagnetic Activity:** Solar winds varied between Background and Slightly Elevated levels, due to minor influence from a small coronal hole in the southwest disc. The Interplanetary Magnetic Field, Bt, was Weak to Moderate, with the important north-south

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component varying weakly and frequent deviations between northward and southward directions observed. Geomagnetic activity was Quiet to Unsettled (Kp1-3).

**Energetic Particles / Solar Radiation:** Solar Radiation remained at Background levels.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Solar activity is forecast to be Moderate to High, with occasional Moderate-class flares expected and a slight chance of isolated Strong flares, primarily from the largest regions in the southeast disc, or a returning region currently located close to the northeast limb.

**Solar Wind / Geomagnetic Activity:** Three CMEs that left the Sun on 25 Nov are being analysed for potential Earth-directed components. Of these, the third, that left the Sun late on 25 Nov from the southwest disc is most likely to affect Earth towards the end of the forecast period, however, further imagery and analysis is required to confirm this.

Solar wind speeds are currently varying between Background and Slightly Elevated levels due to an ongoing, but declining connection to a small coronal hole in the southwest disc. This enhancement is expected to further wane on Day 1 (26 Nov) with solar winds expected to become persistently Background. No other significant recurrent or fast wind enhancements are forecast during the period.

Geomagnetic activity is expected to be mainly Quiet to Unsettled through the period, but with a slight chance of peak G1/Minor Storm conditions on Day 4 (29 Nov). Please note that probabilities will likely change for the end of the period once the various CMEs currently under analysis have been confidently modelled.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is expected to persist at Background levels, with a slight but increasing chance of Solar Radiation storms occurring during the period, mainly from the large sunspot regions in the southeast.

## Geomagnetic Storms

| Geomagnetic Storm | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|---|---|---|---|---|---|---|
| Probability (Exceedance) | | | (%) | (%) | (%) | (%) |
| Minor or Moderate | G1 to G2 | No | 1 | 1 | 1 | 20 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

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## Radio Blackouts - X-Ray Flares

| X-Ray Flares | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|---|---|---|---|---|---|---|
| Probability | | | (%) | (%) | (%) | (%) |
| Active | R1-R2 (M Class) | Yes | 75 | 75 | 75 | 75 |
| Very Active | R3-R5 (X Class) | No | 15 | 15 | 15 | 15 |

## Solar Radiation Storms (High Energy Protons)

| Radiation Storms | Level ($cm^{-2}sr^{-1}s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) | Day 2 (00-24 UTC) | Day 3 (00-24 UTC) | Day 4 (00-24 UTC) |
|---|---|---|---|---|---|---|
| Probability (Exceedance) | | | (%) | (%) | (%) | (%) |
| Active | ≥ S1 | No | 10 | 15 | 15 | 15 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |
| * S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$) | | | | | | |

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